CALIFORNIA EROSION DIGEST

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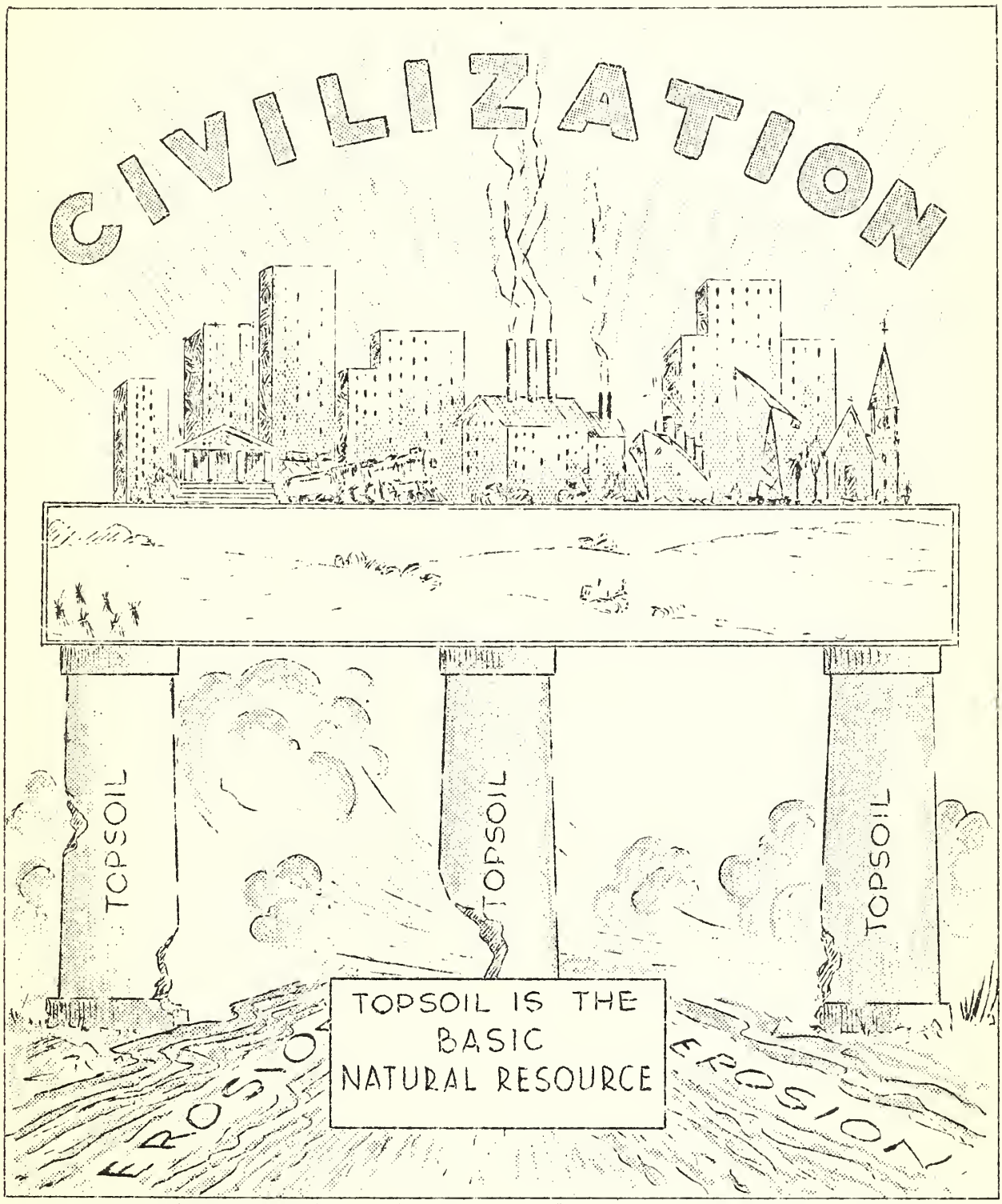

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

THE SOIL SAVER

by

Harry E. Reddick, Regional Director

(Editor's Note: Our Regional Director made the following radio talk, "The Soil Saver", as a contribution to the conservation program presented by the Western Farm and Home Hour. The talk was made Thursday, April 25, 1935, through station KPO and nine other stations of the Western Division of the National Broadcasting Company. Corralitos cooperators, particularly, will be interested in reading it).

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The watershed of Corralitos Creek, in Santa Cruz County, California, was originally covered and protected with California redwoods and other evergreen trees. The undergrowth was ferns and wild berry vines. There still remains some of the virgin redwood in the watershed, and there is still a large portion of the area that is covered with second and third growth trees. As early as 1883, many hillsides were cleared and planted to orchard.

The U. S. Soil Erosion Service has established a demonstration project in the Corralitos Creek Watershed for the purpose of demonstrating proper methods of saving the top soil. These methods can be applied to most cultivated sloping lands. It will be one of the purposes of the Soil Erosion Service to reforest some hillsides that have been found to be too steep for cultivation. With this in view, over a million trees are now being started in the Soil Erosion Nursery near Watsonville, for planting in the spring of 1936. Certain areas will be reforested in a solid or continuous fashion; others will have strips of trees 50 to 100 feet wide, with 100 feet between strips left open for pasture. Forests and good pasture prevent erosion.

When cleared and clean-cultivated, many of the sandy loam soils on the coastal plain are decidedly erosive; not only the top soil is washed away by the runoff, but rills and small gullies are formed. Sometimes the soil becomes saturated, has the appearance of being more or less liquid, and will actually flow down the steeper slopes. When such a flow reaches a change of grade, or is slowed up in other ways, the load of sand is dropped, forming steeply sloping alluvial fans. When this occurs in orchards many rills form between each tree row; every cultivator mark or wagon track up and down the slope of the land, furnishes starting points for deeper rills and greater soil losses.

Erosion not only robs the land of its fertile top soil, but often uses its plunder to do further damage on the lower levels, through the deposition of sand washed off the hillsides and clean-cultivated orchards above.

The best method of control for erosion on such types of land calls for the development of a permanent vegetative cover, returning the land to as near its natural state as possible. This cannot be done on steep slopes that are continually cropped. In some places strips of permanent vegetation planted across the slopes of the orchard at intervals have been found beneficial . . . the strips of grass or cover crop are planted as nearly on the contour as possible. Rills and small rivulets that start in the open, or on clean-cultivated portions of the orchard are spread out, slowed up, and even absorbed by the strips of permanent

vegetation.

Several new apple orchards have been planted this winter in the Corralitos area, and in each case the rancher has had explained the advantages of the contour orchard planting system and all of this spring's plantings have been laid out by that method by the Engineers of the Soil Conservation Service.

What is a contour orchard, or a contour planting system? This brings up the question of "What is a contour?" A contour is a line joining points of equal elevation. Therefore, a true contour laid out across a hillside would be dead level from end to end. Contour orchards are not planted on exact and true contours, but laid out on a true grade line having sufficient fall for irrigation and for safely carrying away excess storm water from the fields. While a certain amount of fall is necessary, the grade should be flat enough to prevent the water from cutting.

In order to lay out an orchard on such a system, the first consideration must be given to the location of diversion ditches or down drafts that will safely carry the excess water from the tree rows to the foot of the slope and into well-defined natural channels. Next, the grade must be determined on which to lay out the tree rows. This may vary from 1% to 3%, the governing factors for determining the correct grade being the steepness of the hill or cross slope, and the texture of the soil. Using either an engineering level or a farm level, the grade lines are laid out on the ground in the approximate locations of the tree rows. If the slope is uniform and other conditions favorable, it is sometimes safe to run grade lines for every other row, and occasionally it is only necessary to run out the lines for every fourth row. Following the establishment of the grade lines, the tree rows are run in, care being taken to locate suitable cross rows and to smooth out the abrupt curves.

It must be remembered that any sudden change in grade, or any low place in the flow line is certain to be the source of future grief. Storm water following the ditches along the tree rows will break through at the low spots, tear down the slope, frequently cutting through each lower ditch as it is reached. The tree rows of a contour orchard are seldom straight rows, but are curves, compound curves, and reverse curves, following the topography of the sloping lands or hillsides. Actually, they are artistic and beautiful. Curves are pleasant to the eye. Nature left the hills with smooth, rounding curves, and it was never intended that man should plant his orchards on rolling land by the sharp-angled square, triangle, or rectangle system.

In the older orchards, which vary in age from ten to forty years, and which were all square planted, the problem of erosion control is a difficult one. Frequently, where the rows run across the slope and nearly approximate the contour, cultivation can be confined to only one direction. Thus a small ridge will gradually develop in the tree rows which in itself will prove beneficial. In some places permanent ditches, on satisfactory grade lines, are being constructed through square-planted orchards. They are built with a smooth channel and rolling bank so that spray rigs and wagons can be handled in the orchards with the least difficulty. In other orchards ditches will be plowed on grade lines in the fall and left throughout the rainy season, following which they are destroyed in the usual spring cultivation.

All ditches must be provided with permanent, safe outlets into diversion

channels. These ditch outlets are constructed of masonry, cement or half-circle corrugated culvert pipe. The diversion channels or down drafts, themselves, must have checks or steps throughout their length to prevent deepening of side cutting. On steep slopes the diversion channels must be permanently lined from top to bottom.

Luxuriant cover crops during the rainy season should be the objective of every orchardist. Vegetation is Mother Nature's method of protecting the top soil and no other means has been found that will quite equal vegetative cover as a preventive of erosion in orchards. In some soils it has been found that fertilizer must be applied before a satisfactory growth of cover crop can be obtained.

As a soil conservation motto, it is well to remember that wherever sloping land must be cultivated all plowing, planting and cultivating must be done on the contour or correct grade line, regardless of crop and regardless of whether it is to be irrigated or non-irrigated. Thus the soil may be saved.

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CORRALITOS COOPERATORS

William Alvoin
William L. Andrews
Randolph C. Bradley
Ben Ceschi
William Daley
Homer Day
Robert D. Day
Joseph F. Enos
Lionell and Alfred Enos
Onerato P. Erta
Chas. Henrikson
Edward L. Herrington
Herman Imgrund
Anton Jercich
Ferdinand Karstedt
Tillie Kasviner
Edward L. Koll
George Kusanovich
Louis N. Kusolich
Louis A. Larson
Mrs. Emma R. Lemon
Amaro F. Morraes
Jack Mustainich
Roy A. Patton
John H. Pinnco
Charles Reinholtz
Mrs. Isabella Rider
Antone J. Rodrigues
Fayette E. Rose
Olof Sandberg
Manuel S. Silva
Jacob R. Spain
Carrol S. Tarkington
Rufino R. Thomas
Mrs. Cornelia M. Trombley
Fred S. Wolfe

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SANDSTORMS AFFECTING PUBLIC HEALTH

Some conception of the tragic aspect of the dust storm cataclysm in the Great Plains may be gained by a study of the reports from the health officers in eighteen counties. With but one exception these officials report an unusual number of cases of pneumonia and throat trouble, either directly caused or aggravated by the inhalation of dust. Five of the officials report fatalities caused by complications attributable to dust. - - From The Land. Official Bulletin, S.C.S. April 1935.

SUMMARY OF EROSION CONDITIONS IN THE UNITED STATES

EROSION CONDITION	ACRES	PERCENT
Total area (exclusive of large cities and water)	1,907,721,392	100
Areas on which erosion conditions were not defined (Mesas, canyons, bad lands, rough mountain land, barren mountain tops, areas above timber-line, scablands, shallow soils with frequent rock outcrop)	144,904,389	7.6
Areas with little or no erosion (less than 25% of the top soil lost)	578,167,570	30.3
Total area affected by sheet erosion	857,386,922	44.9
One-fourth to three-fourths top soil lost	665,086,000	34.9
Over three-fourths top soil and some subsoil lost	192,300,922	10.1
Total area affected by wind erosion	322,961,231	16.9
Moderate wind erosion	234,023,574	12.3
Severe wind erosion	79,753,880	4.2
Destroyed by wind erosion	9,201,777	0.5
Total area affected by gullying*	866,821,976	45.4
Occasional gullies	524,792,576	27.5
Severe gullying	337,851,662	17.7
Destroyed by gullies	4,177,783	0.2

* In the western states, a considerable proportion of the gullying is normal geological dissection (erosion) on which accelerated erosion may be, but is not necessarily, active.

SUMMARY OF EROSION CONDITIONS IN CALIFORNIA

EROSION CONDITION	ACRES	PERCENT
Total area (exclusive of large cities and water)	99,634,672	100
Areas on which erosion conditions were not defined (Mesas, canyons, bad lands and rough mountain lands)	863,672	0.9
Areas with little or no erosion (less than 25% of top soil lost)	52,112,417	52.3
Total area affected by sheet erosion	38,020,668	38.1
One-fourth to three-fourths top soil lost	34,914,320	35.0
Over three-fourths top soil and some subsoil lost	3,106,348	3.1
Total area affected by wind erosion	1,999,164	2.0
Moderate wind erosion	33,080	*
Severe wind erosion	1,566,331	1.6
Destroyed by wind erosion	399,753	0.4
Total area affected by gullying	22,659,116	22.7
Occasional gullies	15,519,778	15.6
Severe gullying	6,824,877	6.8
Destroyed by gullies	314,461	0.3

* Less than one-tenth of one percent
\# Includes areas with undifferentiated geological erosion

REGIONAL ADVISORY COUNCIL
of the
SOIL CONSERVATION SERVICE FOR CALIFORNIA
UNITED STATES DEPARTMENT OF AGRICULTURE

(Editorial Note. The California Erosion Control Project has an active Regional Advisory Council. In order that our readers may become better acquainted with these men we are running the following brief biographies with emphasis placed on their agricultural and conservation activities. Regular bi-monthly meetings are held with an average attendance of seven of the eight members.

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Twenty years of experience in the agricultural activities of this region is the splendid contribution of Vincent F. Blanchard to the Advisory Council. He was born in Piru, California, in 1892, moving, with his family, to Santa Paula shortly thereafter. Graduating from high school he worked for a year at Rancho Sespe and after receiving a Bachelor of Science degree in Agriculture at the University of California, he returned to Rancho Sespe for a short period before becoming horticultural inspector for the Oxnard district.

Following a period of service in the U. S. Army and a short time again in horticultural work at the Rancho Sespe he became Assistant Farm Advisor of Los Angeles County in 1919, working primarily with the varied horticultural interests of that county. In January, 1925, he became Farm Advisor of Ventura County and has rendered valuable service to the agricultural interests of this important southern California county. He was actively associated with Professor Weir in establishing the first erosion control project in California.

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George H. Cecil brings to the Advisory Council thirty years of experience as a government forester. He was born in Baltimore, Maryland in 1877, was educated in the public schools there, and in 1903 graduated from the Biltmore Forest School. Two years later he entered the U. S. Forest Service as Technical Assistant in Wyoming. During the years following his appointment he advanced steadily, working in Montana, Washington, D. C., Oregon, Washington, Alaska, and Los Angeles, where he served as Supervisor of the Angeles National Forest from 1925 to 1929. At present he is Executive Secretary of the Conservation Association of Los Angeles County (a non-official organization) and Manager of the Conservation Department of the Los Angeles Chamber of Commerce.

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George P. Clements, a state and international authority on agricultural economics and conservation, brings to the Soil Conservation Service the benefit of well seasoned advice. Dr. Clements was born in Dumfries, New Brunswick, Canada, in 1867, and received his degree in medicine from the University of Nebraska in 1896. Coming to California for his health he lived in Riverside, devoting his time to plant introduction and breeding and to a study of southern California. In 1918 he established the Agricultural Department of the Los Angeles Chamber of Commerce. Since that time he has been active in constructive movements in agriculture, agricultural economics, and social and public health in the Pacific South-

west as well as aiding in the establishment of a plant quarentine and pest control service for Mexico. He has studied agricultural lands throughout North America. His contributions to agriculture were recognized by France in 1933 when the honor of Chevalier du Merite Agricole was conferred upon him.

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E. I. Kotok, Director of the California Forest and Range Experiment Station, Berkeley, is an outstanding leader in the forestry profession. Born in Russia in 1888 he graduated from the University of Michigan, receiving the degree of Master of Science in forestry from that institution in 1911. That same year he entered the U. S. Forest Service and in 1915 he was named Forest Supervisor of the Eldorado National Forest, remaining in charge there until the end of 1918. From 1919 until 1926 he was in charge of California Fire Control Region No. 5. Named Director of the California Forest and Range Experiment Station in 1926, he is the author of the following articles on soil erosion: "Erosion: A Problem in Forestry." Journal of Forestry, February, 1931; "Vegetative Cover," the Water Cycle and Erosion." Agricultural Engineering, April, 1931.

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Walter W. McLaughlin, an authority on irrigation and drainage was born in Colorado in 1876. In 1896 he received his Bachelor of Science degree in Civil Engineering from Utah Agricultural College and six years later a Master's degree in soil physics and irrigation from the University of California. From 1899 to 1914 he worked on drainage and irrigation problems for the Utah Experiment Station, the U. S. Department of Agriculture and private companies. The last four years of this period he held a professorship in the Utah Agricultural College. In 1914 he came to California as Associate Irrigation Engineer in the U. S. Department of Agriculture and is at present Chief of the Western Division of Irrigation in the Bureau of Agricultural Engineering. He has written various state and government bulletins and numerous papers for scientific publications. He is a member of the American Society of Agricultural Engineers and of the International Soil Congress.

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Charles C. Teague, President of the California Fruit Grower's Exchange, has been a leader in the development of marketing organizations of California agricultural products. He was born in Caribou, Maine in 1873. He received his education in the public schools and at St. John's Military School in Salina, Kansas. Coming to California he settled in Santa Paula in 1893 and still maintains his residence there. During the last 20 years he has held executive offices, (usually the presidencies) in agricultural associations and cooperative organizations of state and national prominence. Among these many organizations a few of the more prominent are; California Fruit Growers Exchange, California Walnut Growers Association, California State Chamber of Commerce, American Institute of Cooperation, National Cooperative Council. He is a regent of the University of California and Director of the National Advisory Board of Stanford University and a member of the Federated Farm Board for 7 years. His services have been recognized by the Universities of California and Maine by awarding him the degree of Doctor of Law

J. Nicholas Thille, one of the most progressive ranchers of Southern California, was born near Santa Monica in 1883, coming to Santa Paula five years later with his family.

With the exception of a year in which he gained valuable experience in mechanics in a Los Angeles machine shop and a year in which he and his brother farmed 2000 acres in Tulare County, he has spent such time as remained from an ever increasing number of public service activities in developing the home ranch near Santa Paula and a number of other citrus and walnut properties in the county. He has long been a leader in progressive agricultural projects. He is Chairman of the Conservation Commission of Ventura County; Director of the Santa Paula Citrus Fruit and Calavo Grower's Associations and was, for two years, President of the Farm Bureau of Ventura County.

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Walter W. Weir has pioneered in soil conservation activities in this state. Through his foresight and effort appropriations were made available for demonstration areas in California. He was born in Vacaville, California, in 1882. He studied civil engineering at the University of California and from 1907 to 1913 was a drainage engineer for the U. S. Bureau of Agricultural Engineering. During this time he made drainage surveys of the Mississippi Delta and of several southern and midwestern states. From 1910 to 1914 he conducted irrigation and drainage investigations in Washington and Oregon. From 1914 to 1917 he was in charge of the Kearney Vineyard Experiment Station, a cooperative endeavor of the U. S. Department of Agriculture and the University of California. He then became Assistant (later Associate) Drainage Engineer, Division of Soil Technology, in the University of California Experiment Station. During this time his work consisted of investigations and research in drainage and alkali problems, as well as observations in the problems of soil erosion control. He obtained leave in 1927 to make a soil survey and land classification of the Sun-River Project in Arizona and again in 1933 to make an economic survey of Imperial Valley.

Mr. Weir is a member of the American Society of Civil Engineers and also of the American Society of Agricultural Engineers, serving as Secretary of the Pacific Coast Section of the latter organization for the past seven years. He is the author of a number of bulletins and scientific papers; of these the most important to those interested in erosion: "Soil Erosion In California, It's Prevention and Control", a University of California publication, Bulletin No. 538. He is also consulting engineer for the Soil Conservation Service in California, serving without salary.

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The policy of erosion control in Japan is based largely upon saving valuable food producing lands from destruction, rather than upon profit from restored lands. During the year of 1925 the Tokyo Forestry Board spent 170,000 Yen on an area of 375 acres for erosion control. The average cost, including the construction of check dams, was 453 Yen per acre. The value of forest land averages about 40 Yen. More than ten times the marketable value of the land was spent per unit area for the purpose of erosion control. These areas of active wash down over rice lands valued at from 240 to 300 Yen per acre. - W.C. Lowdermilk, Erosion Control in Japan.

SOIL CHARACTER IMPORTANT IN
EROSION CONTROL

Leonard Wohletz, Jr. Soils Expert

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One of the more important steps in planning a program of erosion con-

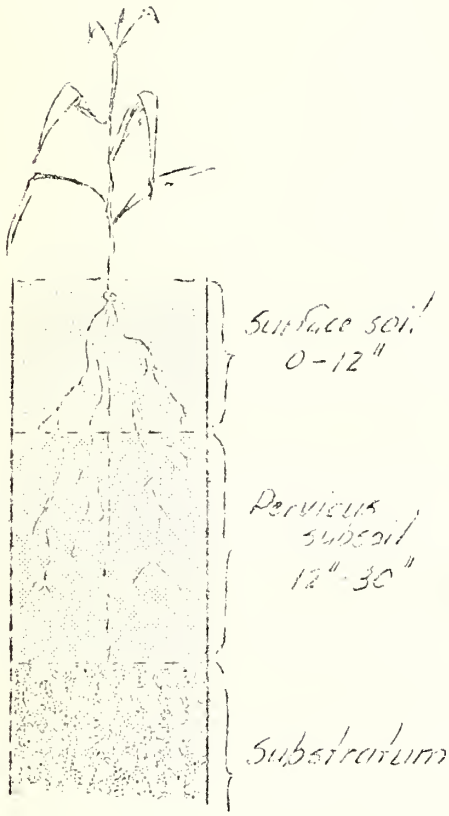

Fig 1 - Soil A

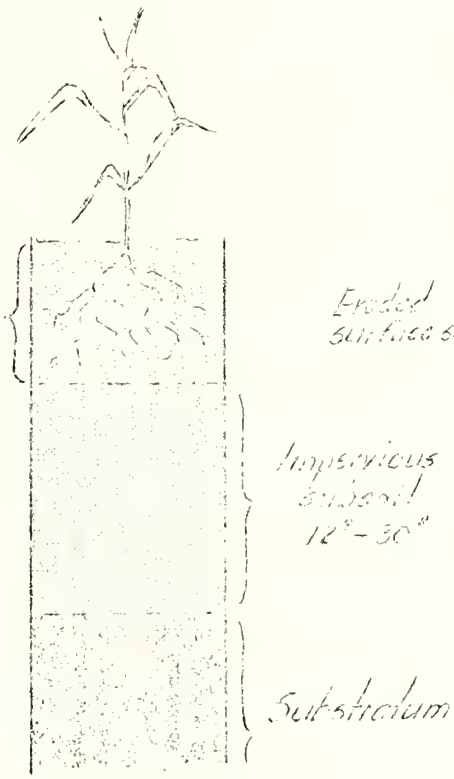

Fig. 2. Soil B

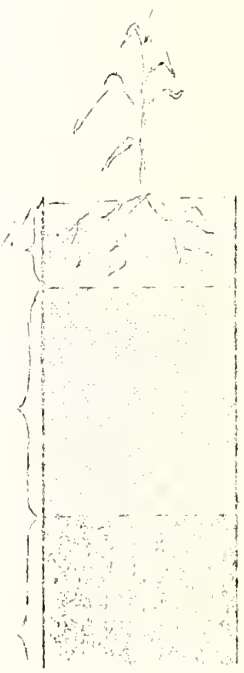

Fig. 3 Soil B
(eroded)

trol is to collect the facts involved in the present utilization of the land. With this objective, a detailed survey is made of each farm to determine the soil conditions, present land use, steepness of slope, and the degree and type of erosion. These are placed on an aerial photograph which serves as a base map, and which shows by a standard set of symbols the general plan of the farm, including fences, roads, drainage ways, gullies, wood lots and buildings.

The soil erosion survey of the Las Posas area has been completed and a single map compiled from the individual field sheets. Prints of this have been colored to show the occurrence, the extent, and the nature of the different soils, particularly those which present the more difficult problems in erosion control. Additional studies are now under way to determine the moisture relation, fertilizer requirement, reaction and crop adaptation of the more important soil types.

The completed survey not only provides an inventory and record of present conditions but also supplies basic information of fundamental importance in

planning the most efficient and effective erosion control programs, and more profitable systems of land utilization. Whenever a new practice proves successful it can be extended immediately to all farms which are shown on the map as having similar conditions of soil and slope. Results have shown that soil characteristics are very important in determining the suitable grade for a terrace or contour ditch. Many of the deeper and more pervious soils (fig. 1) are capable of absorbing unusually large amounts of water. In the case of these the principal problem is that of retarding the surface flow long enough to permit penetration. Such a soil (fig. 1) is admirably suited to a wide variety of crops, including the deeply rooted ones. In the case of soils having a tight, impervious subsoil (fig. 2) which restricts and hinders moisture movement, the problem involves the removal of excess water with as little erosion as possible. Whenever erosion remains uncontrolled on such soil, the water which does not penetrate the soil mass runs off, producing the eroded condition shown in figure 3. The feeding zone of the plant root system is restricted by the impervious subsoil, a condition which becomes increasingly acute as erosion losses continue. As the absorptive surface soil is removed (fig. 3) erosion continues at a constantly increasing rate. In the case of soils which rest on a consolidated substratum, a knowledge of their character and depth of occurrence is particularly valuable in laying out ditches and structures so as to take greatest advantage of this non-erosive bedrock.

Thus, briefly are suggested a few of the ways in which the more obvious features features of the soil profile effect erosion control programs as well as land use planning.

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The name of Louisa A. Vetter was unintentionally omitted from the list of Arroyo Grande cooperators in the April issue of the Digest. Sorry!

Our Regional Director addressed the State Association of Agricultural Commissioners' convention at Sonora the sixteenth on "The Soil Conservation Program in California."

Twenty-five students from U.C.L.A. toured the demonstration area in the Las Pocas on the eighteenth and were accompanied by W. B. Hooper, Extension Agent. W. H. Von Trebra, Assistant Agronomist, and Howard Gabbert, Assistant Agricultural Aide, who explained the work being done to control the washing of the soil.

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Dr. Stanley W. Cosby, Chief Soil Expert, was one of the representatives at the Soil Conservation Service conference held at Colorado Springs, Colorado, the twentieth and twenty-first. Seventy-five representatives from projects located west of the Mississippi were there. Various matters of policy and procedure were discussed. A. E. McClymonds, formerly Chief Agronomist here, and now Regional Director for Colorado, presided over the meetings. Wind erosion is the big problem in that state. One-time fertile acres of Colorado land that produced bumper crops of pinto beans and corn as late as 1930 are now on the verge of abandonment as the culmination of five years of wind erosion. Thirty bushels of corn to the acre in 1930 - - ridges of sand along fences and buildings today. Twelve to fourteen inches of surface soil have been lost from most of the affected area. The Service is getting extensive erosion control measures under way. Most of the wind-blown area will be revegetated with pasture grasses and converted to grazing

uses. It was Dr. Cosby's opinion that those who are attempting to crop their eroded fields will get only negligible returns.

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Excerpts from: Farmers of 40 Centuries Speak to the Farmers of America; by Mrs. Inez Marks Lowdermilk. The Land Today and Tomorrow, April 1935. Official Bulletin, Soil Conservation Service, U.S.D.A.

"Doubtless many people think of China in terms of famines, floods, and low standards of living. The 1933 census gives China a population of 492,000,000 people - - almost a half billion, sprawled half way across Asia, where they have lived since the dawn of history. Almost 350,000,000 are rural peoples.

China's first settlers found, as did our pioneers, a land comparable in size to the United States and equally well endowed with forested mountains, rich valleys and other natural resources. China dates the period of her "Golden Age" from 200 B.C. to 1200 A.D., when there was abundance for all and every one was honest. Then why this poverty and decline?

One evidence greets the traveler on the ocean, a hundred miles before land is sighted, in the form of a great yellow pathway coming out of the mouth of the Yangtse River as it pours forth rich silt-laden waters from the farm and mountain lands of central China. The Yellow Sea is so named because for centuries the Yellow River has dumped billions of tons of soil from the loess lands and denuded watersheds of north China, until the Sea is yellow with China's lost productivity and a portion of her population in the hinterland lives on one or two meals a day.

The appalling thought that should arouse every thinking person in the United States is that we have exploited and are destroying our natural resources at a rate never before known in the history of the world. It took China several thousand years to exploit and destroy land resources that we have done in from fifty to two hundred years.

What is this destructive force which has already totally destroyed, here in the United States during our few years of exploitation, over 51 million acres of our good farm lands and is in the process of destroying 200 million acres more? It is soil erosion, by water and wind."

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SOIL CONSERVATION BILL PASSED IN WISCONSIN

Wisconsin has passed a bill which will be of interest to those working on soil conservation all over the country. The bill provides tax exemption for farm wood lots up to one-fifth of the total farm acreage if the land is fenced to keep out grazing animals. Any amount of land with a gradient of thirty percent or more on a regularly operated farm is tax exempt if the owner makes a reasonable attempt to reforest or revegetate it and does not use it for cultivation or grazing. This bill should be a strong inducement to farmers to cooperate in erosion control. The increased acreage of native cover will also aid in wild life conservation.

 Walter A. Lloyd.